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THIS PUBLICATION GIVES INFORMATION on new developments of interest to agriculture based on the work done by scientists and agricultural field men of the du Pont Company and its subsidiary companies.

It also gives reports of results obtained with products developed by these companies in the field whether the tests are made by field men of the companies, by agricultural experiment stations or other bodies. Also data on certain work done by agricultural stations on their own account and other matters of interest in the agricultural field.

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The Relation of Insecticides to Plant Growth Discussed in Paper at the Dearborn Conference.

Blasting with Dynamite to Control Marsh Fires Whether on the Surface or in Dry Peat Beneath.

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INDUSTRIAL CHEMISTRY MAKES MANY USES OF CELLULOSE
AS A RAW MATERIAL IN A WIDE RANGE OF MANUFACTURES

EDITOR'S NOTE:- In this discussion of "Cellulose and Civilization", Dr. Hahn supplies facts of interest and value to all concerned with agriculture from the standpoint of the growing importance of the farm as the source of basic raw materials for industrial uses.

By Frederick C. Hahn,
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E. I. du Pont de Nemours & Co.

Cellulose is one of the most plentiful of materials supplied by nature. Millions of tons of it are produced annually in the form of fibers during growth of such plants as cotton, trees, straws, grasses, cornstalks, sugar-cane, flax, and hemp. The use of cellulose in the form of paper and textiles dates back many centuries and is familiar to everyone. However, there is another use of more recent development for cellulose, which in some form or other reaches into every phase of life. This use may be called the chemical use of cellulose; that is, those applications that depend on the use of cellulose as a chemical raw material.

For chemical purposes, cellulose from wood and the cotton plant is used almost exclusively. The cellulose in wood is isolated by digesting wood chips under pressure with sulfite liquor (made from lime and sulfur), although for paper other processes such as the soda and sulfate methods are used to free the cellulose from the other constituents of the wood. Cellulose in the form of cotton or cotton linters is found in a much higher state of purity in nature and therefore requires less drastic treatments in its preparation for chemical use. Crude cotton linters are purified by digestion in dilute caustic soda solution under pressure at elevated temperature. High quality cellulose can be produced from many other cellulosic materials such as sugar-cane bagasse, cornstalks, bamboo, flax, hemp, but to date these sources of cellulose have not been able to compete economically with wood.

To give one an idea of the magnitude of cellulose consumption for chemical and related uses, in the du Pont Company alone the cellulose products represent about 52,000,000 pounds of cotton and 74,000,000 pounds of wood pulp annually. Consumptions such as these are of sufficient magnitude to have beneficial effects to the cotton farmer and the woodsman.

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Nitrocellulose Products

When cellulose is treated with a mixture of nitric and sulfuric acids, a cellulose derivative known as nitrocellulose is formed. This product, which attracted attention initially as the basic ingredient of smokeless powder, has now found other applications that far overshadow this initial use.

Nitrocellulose dissolves in many solvents such as ether-alcohol, ethyl acetate, butyl acetate, to give viscous solutions or "dopes". If these solutions are spread in thin layers on a smooth surface and the solvent allowed to evaporate, a transparent flexible film remains. This characteristic of nitrocellulose, as well as of other derivatives of cellulose, constitutes one of the fundamental bases for the broad application of cellulose and cellulose products. This property, as can readily be seen, forms the basis for the manufacture of film for motion pictures, X-ray, and photographic purposes; lacquers and finishes such as "Duco"; cements such as "Duco" household cement; coating compositions for cloth in the manufacture of "Fabrikoid", book cloth and other coated textiles; for all of which uses, the formation of a tough flexible film is required. In most cases modifying agents such as softeners and plasticizers are blended with the nitrocellulose in order to produce films of different characteristics as regards flexibility, softness, rigidity, suppleness, and many other characteristics. In the case of lacquers and coating compositions, color effects are obtained through the incorporation of dyes and pigments.

Cellulose in Plastics

Another fundamental characteristic of nitrocellulose and certain other cellulose derivatives is their property of becoming plastic when blended with various compounds known as plasticizers. One of the most common plasticizers is camphor which is used with nitrocellulose in the manufacture of "Pyralin" plastic. As the reader well knows, beautiful effects are obtained in such plastics through the various blending processes involving the use of dyes and pigments. These effects are exemplified in toilet articles, fountain pens, umbrella handles and many other articles. Transparent "Pyralin" sheeting forms the protecting interlayer in laminated safety glass. Space is too short for describing the numerous other uses for this plastic. It may be said that this versatile material finds its way into all households in important large or small uses essential to the comforts and conveniences of every-day life.

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How "Cellophane" is Made

When cellulose is treated with a solution of caustic soda and carbon disulfide (a liquid made from coal and sulfur), a cellulose derivative known as cellulose xanthate is formed. This cellulose derivative, when dissolved in dilute aqueous caustic solution, forms a viscous solution known as viscose. When viscose is treated with an aqueous solution containing a salt and an acid, the cellulose xanthate is coagulated and the cellulose is regenerated. If viscose is extruded in sheet form into such a solution, the cellulose is regenerated in the form of a film. Such a process forms the basis for the method used for manufacture of "Cellophane" (du Pont's trade-mark for its cellulose film). Of course, the regenerated cellulose sheet is subjected to many subsequent steps before the finished product is obtained. For example, the crude sheet is washed to remove salts and by-products and then glycerin is introduced to maintain a soft pliable sheet after the product is dried. In making moisture proof cellulose films, the sheeting is subjected to a coating process.

Rayon a Cellulose Product

If viscose is squirted through small holes, known as spinnerets, into an acidic solution, the cellulose is regenerated as a fine filament, many of which are combined to form viscose rayon yarn. In the commercial production of rayon, the viscose is spun simultaneously from numerous spinnerets, each of which contains numerous holes. During the spinning process it is important that speed of travel and the degree of stretching of the filaments be controlled carefully to produce a rayon of the highest quality. Attention must be given also to the minutest details in the washing, bleaching, and drying of the product.

It is not necessary to describe the many uses of transparent wrapping material in packaging, decoration, and textile fields; and likewise of rayon which has made possible the creation of fabric effects impossible with natural fibers. So widespread has become the use of rayon that the United States consumption in 1935 was 250,000,000 pounds, or four times the consumption of natural silk.

Various Uses Developed

There are many other familiar uses for viscose. "Cel-O-Seal", (bottle caps), to protect the consumer from counterfeit products, is made by regenerating cellulose in special forms. Artificial sponges and insulating materials are produced by coagulating and regenerating cellulose in a porous form. Casings or tubes are made by extruding viscose in the form of a continuous tube into an

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acidic solution. One of the many uses of such tubes is for sausage casings. As with cellulose films and viscose rayon, the production of suitable materials for the various applications has been accomplished only as the result of extensive research and development work involving the selection of suitable raw materials, choice of optimum reaction conditions, and careful control throughout the manufacturing process.

Cellulose Acetate Products

Cellulose acetate is obtained by the action of acetic acid and acetic anhydride on cellulose. Like nitrocellulose, it dissolves in various solvents to form viscous solutions, although its specific solubility characteristics are different from those of nitrocellulose. Its solutions or "dopes" are used for making du Pont safety film for home movies and for photographic film. Cellulose acetate is used also for making "Cel-O-Glass", in which the thin plastic sheet is reenforced with wire mesh. This product is used extensively in the construction of poultry houses, for general utility construction on farms, and for solariums. Cellulose acetate is particularly suited for this purpose because it transmits, to a much higher degree than ordinary glass, the ultra-violet light rays from the sun that are so essential to the health and growth of living beings. Cellulose acetate finds extensive use in the form of "Plastacele", a plastic, and as an interlayer for laminated safety glass.

When a cellulose acetate solution is squirted in the form of a fine stream into air, the solvent evaporates, leaving a fine filament. According to this general procedure, cellulose acetate rayon of which "Acele" is an example, is manufactured. On a commercial scale, as in the case of viscose rayon, the cellulose acetate solution is extruded continually through numerous spinnerets each of which contains numerous small holes. As the fine streams of viscous solution emerge from the spinneret, the solvents start evaporating and the streams congeal quickly to a plastic filament. These solidified filaments after passing through an air chamber are wound on a bobbin which places sufficient tension on the filament that the desired degree of stretching is effected. This newer type of fiber, which may be dyed with numerous dyes, finds extensive application in the fabrication of textiles for high-style women's wear, linings for suits, and upholstery material.

Benefits to Agriculture

The foregoing discussion gives only a fleeting glimpse of the vast scope and importance of cellulose product industries. The manufacture of such products constitutes a large part of the du Pont business. These industries came about entirely as a result of

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systematic research and development work in the field of cellulose chemistry. The du Pont Company is continually conducting exploratory research in the field of cellulose chemistry and many of the potentialities of this general field remain yet to be uncovered.

Cellulose, because of its chemical, colloidal and physical structure, lends itself to adaptation in a multitude of ways. It may be combined with many acids other than nitric and acetic to form useful products. Furthermore, it may be etherified with many groups to give an entirely new series of cellulose derivatives. It is likely that some of these new products will form the basis for industries of the future. Chemical research is the key which will open this door. As these developments in cellulose chemistry are extended, the country as a whole should benefit through the increased consumption of agricultural products, new industries, and greater employment, and through the added necessities, conveniences and luxuries available to all.

A good measure of the importance of an industry to civilization is a visualization of what would happen if that industry were suddenly eliminated. The elimination of products based on cellulose from life today would soon revert civilization toward the Stone Age. The elimination of products based on chemical reactions of cellulose, although not so serious, would mean a great step backward in civilization.

THE RELATION OF INSECTICIDES TO PLANT GROWTH
DISCUSSED IN PAPER AT THE DEARBORN CONFERENCE

EDITOR'S NOTE:- It is regretted that its length does not permit the reprinting of Dr. DeLong's valuable paper in its entirety. It is probable that a complete copy may be obtained on request from the Farm Chemurgic Council, Dearborn, Michigan.

Dr. Dwight M. DeLong, professor of entomology, Ohio State University, presented a highly informative and interesting paper on the relation of insecticides to plant growth at the Second Dearborn Conference at Detroit, Michigan, on May 14, 1936. The excerpts quoted here are largely from the part of the paper which deals with chemical control of destructive insects of plants.

To quote Dr. DeLong: "We have for many years recognized the fact that certain chemicals furnished the most promising means of fighting some of these pests when properly mixed, diluted and applied to plant foliage. In this method of control we must recognize the fact that we are using these chemicals in connection with two colloidal systems which are very similar in type, for there is very little fundamental difference between plant and animal protoplasm. We are attempting, however, in the use of these chemicals, to destroy one of these colloidal systems (the insect) without injuring the other (the plant) and we must consequently face the fact that the limitations between which we are working are very close and only a narrow margin or degree of safety exists.

"We must add to this the further consideration that the life of the plant and consequent crop or fruit that it produces depends upon maintaining a green color and normal physiologic condition because the plant by the aid of sunlight, carbon dioxide and water manufactures through the chlorophyll everything that the plant is able to produce. It is difficult to apply any chemical to the surface of a plant without changing in some way the physiological condition. If the cells of the leaf are killed or if the processes of the plant, such as transpiration or respiration, are changed so that the chlorophyll may be affected, practically nothing has been accomplished in controlling the insect for the plant has been destroyed or crop reduced by the chemical.

"The investigation of insecticides, therefore, especially when they concern plants, must be approached from two angles, the degree of toxicity to the insect and the relative degree of safety

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which is afforded the plant. For no matter how good the insecticide might be from the standpoint of insect toxicity, it will prove of very little value if it cannot be used safely on the plant. On the other hand it is possible to produce plant physiologic effects that may prove of value as measures of insect control."

Following the foregoing introductory statements, Dr. DeLong described in a very able manner the types of injuries which may be caused by some of the common insecticides and concluded with an instructive discussion of insecticidally induced immunity in plants to sucking insects. This part of the paper follows.

"Immunity in the case of plants has recently been defined by Chester as 'the capability of withstanding infection acquired by the host either through the introduction of protective chemical substances of biological origin (passive) or through the elaboration of such protective substances in the host as a result of stimulation by the parasite.'

"Those materials known as insecticides have always been considered as products which contained physical and chemical properties which produced toxic effects upon insects directly. Insects feed in two general or fundamental ways. One general group chew off and swallow portions of plant foliage while another group have what is known as sucking mouth parts and can obtain their food only by inserting their beak like mouth parts into the plant tissues and proceed to suck out the juices from the plant. It would be foolish and useless to place an arsenical (or similar material) on the outside of the plant leaf and expect to kill the sucking insect by this material being taken into the alimentary tract.

"It has therefore been commonly believed and recommended that in order to kill these sucking insects it was necessary to use insecticides which are known as 'contact' materials and which have a direct insecticidal action upon the insect by the liberation of gases or other corrosive or penetrative effect upon the body of the insect. Such materials as nicotine sulphate, pyrethrum, derris and rotenone are known to produce toxic effects in this way. As a rule these materials have only an immediate toxic effects and when a few hours time has elapsed after they have been applied, these sprays are of no further value as insecticides.

"Until recently the plant has not been considered as a factor in insect control and has been given consideration only as mentioned above when it might be injured by chemical materials which were applied in attempting to control insects.

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"About ten years ago experiments were undertaken to control the potato leaf-hopper (*Empoasca fabae* Harris) a sucking insect, on bean and potato. Several materials were used some of which, pyrethrum for instance, reduced the field population immediately but had no further effect upon the young leaf-hoppers that continued to hatch from the eggs and which soon became very abundant upon these plants. Field experiments soon indicated that certain other materials when applied to these plants in the field gave no immediate results as toxic agents and had no immediate effect upon the reduction of these populations, but in the course of three to five days after their application they reduced these populations remarkably, causing motor paralysis of the insects and death.

"Furthermore, the toxicity of these materials persisted as the eggs in the plant tissues continued to hatch over a period of several days and the young leaf-hoppers upon hatching began to feed. A series of experiments were then carried out to further ascertain whether the leaf-hoppers died because of the spray applied upon their bodies or the spray materials upon the plant. Several hundred were therefore treated with these sprays and placed upon untreated plants and less than 5 percent died from this severe treatment. But if the plant was treated and the untreated insects were then placed upon the treated plant at varying intervals of from a few hours to several days afterward, and were permitted to feed normally upon these plants, the insects would die in the manner mentioned above.

"There was still a possibility that the insects might be killed because of a contact with the dried spray residue on the leaf. In order to determine the possibility of this causing toxicity only one surface of the leaf was exposed to the spray material. The insects were then confined in special feeding cells to the unsprayed surface of the leaf and in a few days they died from the apparent and typical effects characteristic of these previous experiments. It was apparent that some change in the plant sap was responsible for the death of these leaf-hoppers. Only local areas of the plant were affected in this manner with the materials used and the plant system as a whole was not affected unless the plant foliage was covered with these sprays. This is apparently in keeping with the factor of immunity in plants in general since the cell is the seat of immunity and the system is usually not affected because of the absence of a circulatory system such as we find in animals.

"This immunity effect or plant conditioning was first produced by Bordeaux mixtures and other copper compounds. Later a similar type of induced immunity was produced by various types of sulphur or their compounds. The apparent killing effect produced upon the insect is the same as in the case of copper compounds, although

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the effect upon the plant may be entirely different in case of these two materials. All types of sulphurs which have been used will produce this effect in varying degrees upon these plants, although the elemental sulphur materials and those forms in which sulphur is not changed chemically by physical and chemical processes have given the best results. For instance dusting sulphurs, 'dry-mix' dry wettable and under some conditions flotation sulphur will give better results than lime sulphur and colloidal sulphur when used to control the potato leaf-hopper on bean plants.

"Materials of this kind which work through the plant to produce toxicity can scarcely be classified as contact insecticides in the same manner as those materials which kill the insect's body or its respiratory system.

"Although we have not been able to decide definitely just what happens after these materials are applied to the plant certain facts and data have given evidence of what may happen. These materials are insoluble when placed upon the plant tissue but in some way either cause the plant to produce abnormal quantities of a toxic material which may possibly be produced normally by the plant only in minute quantities, or the chemical effect upon the plant may be direct by causing the character of the sap to change remarkably and the general rate of metabolism to change by the presence of extremely small amounts of the chemical which has been absorbed in some form by the plant. Experimental work has given evidence of both possibilities.

"We have demonstrated that soluble copper is produced from the insoluble residue of Bordeaux and absorbed in minute quantities by the plant tissues. The quantity however is not sufficient to account for the toxicity of the leaf-hoppers as a direct chemical poison because we have determined the amount of copper necessary to act as a poison directly. We do know however that certain physiological and biochemical conditions in the plant are changed remarkably. Field tests show that the transpiration rate or loss of water rate by the plant was greatly reduced on the Bordeaux sprayed plant especially the under surface of the leaf was affected. Furthermore, the total sugar and sucrose content of the leaves usually remains higher but the reducing sugars were lower in the sprayed than in the untreated plants. On the other hand the various forms of nitrogen were present in greater amounts in the unsprayed leaves in all cases.

"As a further evidence that the plant is induced to form some substance and is probably responsible for the toxic material this situation might be cited. On the apple foliage where the potato leaf-hopper commonly feeds several species of the leaf-hoppers belonging to other genera (*Erythroneura* and *Typhlocyba*) also occur

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which feed entirely on mesophyll tissue (outer tissues of the leaf) while the leaf-hopper mentioned above feeds on the phloem (vein). This latter tissue is the conducting tissue through which the plant translocates the sugars and other materials manufactured by the leaves. The mesophyll feeders are not affected by these spray materials but the phloem feeders are. This is strong evidence that the plant is producing and translocating a material which serves as the toxic agent and this is induced by the spray material known as the insecticide which is placed upon the leaf.

"Insecticides and other spray materials when applied to the plant may therefore affect it both chemically and physically. The chemical effect may be direct and cause injury to the plant. The physical effect may change the physiological processes and either injure the plant or cause it to produce a residual toxicity effect which apparently is accomplished by a conditioning or partial conditioning of the plant to produce a killing effect upon the insect and in which case the chemical in itself may not be a real insecticide and have no direct effect upon the insect."

BLASTING WITH DYNAMITE TO CONTROL MARSH FIRES WHETHER ON THE SURFACE OR IN DRY PEAT BENEATH

EDITOR'S NOTE:- The suggestions offered here on the control of marsh fires are timely. If adopted when necessary, they could result in preventing damage to farm crops in some instances. As is pointed out, however, blasting in a burning marsh could be extremely hazardous unless the proper precautions are taken.

By L. F. Livingston, Manager,
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Fires in dry marshes are frequently difficult to control. This is particularly true in the case of a fire below the surface, which sometimes occurs. The drought of recent weeks has greatly increased the possibility and the hazard of marsh fires. However, experience has shown that where a fire can not be put under control by other means, ditching with dynamite will confine the fire within the burning area.

Not only will a blasted ditch serve as a fire-break itself, but the wet muck and water blown out by the blast and spread for a considerable distance to the sides of the ditch will tend to retard a surface fire on the side from which it is approaching.

Controlling a Sub-surface Fire

It has happened that a marsh surface was covered with a farm crop or other growing vegetable matter while between the surface and the water table there was a stratum of dry peat which had been ignited. The way a fire of this type in a Middle West State was handled was by blasting a circular ditch around the burning area. The ditch method proved successful after various efforts, including the use of city fire apparatus, had failed.

A ditch, deep enough to penetrate to the underground water level, was blasted. After the blasting, men were stationed at a number of points and when the underlying peat burned through to the ditch bank, these men saw to it that sparks were not carried by the wind to the other side or, if so, that any new fire was promptly extinguished.

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In preparing to blast this ditch, the greatest care was exercised not to attempt to load the dynamite at points already reached by the sub-surface fire. A post-hole auger was used to bore test holes well beyond the known burning area before any loading was done. This precaution is imperative and its importance can not be stressed too much. Otherwise, a serious accident might result.

Similarly, when blasting a ditch to control a surface fire, the ditch should be staked out far enough away from the fire to allow time for loading. Great care should be taken to protect the dynamite and blasting caps from flame or heat.

Kind of Ditch and Method of Loading

Naturally, in blasting an emergency ditch where speed is a principal consideration, there is not time to make soundings or do other things necessary for efficiency and economy in blasting. It is important, however, to make certain that the ground is sufficiently wet to permit blasting by the propagated method, or load the dynamite deep enough for the explosive to be in water below the surface. Where deep loading is required, charges heavier than usual will be necessary to remove the burden of material. Any practical blaster, experienced in ditch work, should be able to decide how deep to load and the number of sticks to a hole needed to blow out the marsh mat and mud.

WINTER FEEDING OF UPLAND GAME BIRDS IN IOWA
HELPS CONSERVE A VALUABLE NATURAL RESOURCE

EDITOR'S NOTE:- Growing recognition is being given to the fact that useful forms of wildlife constitute a valuable national asset. Also, it is being realized that the decrease in game birds and game animals is due more to lack of proper environment and care, especially during the winter months, than to taking by hunters, or other causes. The numbers of wild creatures that survive the coming cold months will depend largely on efforts made from now on to protect them. Invaluable information on the subject of protecting wildlife is given in "Upland Game Birds in Iowa," Extension Circular 228, by Thomas G. Scott and George C. Hendrickson, Department of Zoology and Entomology, Iowa State College, Ames, Iowa. An excerpt from this circular follows.

In winter the problem of getting enough to eat is serious with the upland game birds. Deep snows, sleet, ineffective cover and continued cold increase the birds' problems of securing enough to eat. As winter wears on the quality and quantity of food diminish. In such times of stress the birds will wander from the home range in search of food, and finding it they are not apt to return, much to the farmer's loss. If the food is not found, starvation and continued cold may kill the birds. Even with a good supply of food the game birds may become thinner in the course of winter. Without a good food supply in extremely cold snaps, quail may live but a few days and pheasants not much longer. Cats, hawks, horned owls and other predators are believed to take many of the individuals weakened by starvation and cold. Through such losses the farmer has learned that winter feeding is one of his most effective conservation measures.

Weed seeds, waste grain, dried berries and fruits are the usual winter foods of such upland game birds as the bob-white, ring-necked pheasant, European partridge and prairie chicken. Among the weed seeds those of lesser ragweed, smartweed and foxtail found in the stubble of small grains and corn fields are extensively eaten when these weeds are buried in snow.

Soft fruits are not considered as sustaining foods in all cases although they appear to be sufficient to carry the ruffed grouse and sharp-tailed grouse through the winter. Sumac and bittersweet berries, rose hips, grapes, blackberries and the like should not be expected to winter such birds as the bob-white, ring-necked pheasant

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and European partridge. These birds require more substantial foods such as cereals. Corn, our most common cereal, is very satisfactory as a winter food.

Several shocks of unhusked corn may be left in the field or placed within 100 yards of protective cover such as thickets, tall weeds and slough grasses. Even better, several short rows of standing unhusked corn near the cover will attract the birds as they soon learn to tear the husks open and remove the kernels. It may not be so convenient to arrange for patches or shocks of soybeans, sorghum cane and millet, but often such crops will serve well instead of corn.

Regular feeding stations are less satisfactory chiefly because they require more time to supply the food. Large, roomy brush piles are often accepted by bob-whites, European partridges and ring-necked pheasants as feeding stations when grain is scattered on the ground or placed in a seed hopper under the brush. Two or three handfuls of grain will last four to five days. Three-sided lean-tos have been used successfully for these birds and also furnished some shelter against the elements.

Where to Locate Feeding Stations

The location of feeding stations is important. It should be located close to shelter that is acceptable to the kind of bird for which it is intended. This prevents much loss of the birds by death from freezing and suffocating while ranging great distances over open country in search of food. Although on very cold days and during blizzards one feeding station for each forty acres placed near a thicket may suffice for a covey of quail or partridges, it is better to have more than one feeding place for each covey. Then the birds may make a choice of where to feed and thus avoid predators that often take advantage of the regular trips of game birds to the same feeding station and wait to catch them. Although pheasants may be satisfied with one feeding station per section of land several would be advisable and in many cases these stations should be located near marshy areas. One may expect the prairie chicken to use the stations provided for pheasants and quail.

In emergencies of deep snow and extremely cold weather there is seldom time to erect the more permanent types of feeding shelters. Simple and practical methods must be used. Then the object is to reach many birds quickly and with little cost. Haphazard scattering of grain along roadsides or in open fields is the least effective as a rule. If the snow is soft the grain soon sinks out of sight and becomes unavailable to the birds. If the snow is hard enough to support the grain such undesirable creatures as crows

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may get most of it. To avoid these difficulties the grain should be placed in some type of natural shelter. Grapevine tangles, thickets and brush piles provide such natural feeding stations. The snow should be kicked aside and the ground laid bare before the grain is put down. It is well to leave it in piles rather than scattered. If natural shelters are not available, build a brush pile out of loose branches. The bushy top of a felled tree will also provide shelter; the main trunk and larger branches may be used for other purposes.

Upland game birds use a certain amount of grit, but generally they are able to obtain enough for their needs at all seasons.

EGYPTIAN AGRICULTURAL SOCIETY OFFERS \$100,000
FOR AN INSECTICIDE TO CONTROL THE COTTON WORM

EDITOR'S NOTE:- It is believed that phases of the subject discussed here are as important as the announcement of a cash prize, even a large one, for a research achievement.

Interest among entomologists and others has been aroused by the announcement that the Royal Agricultural Society of Egypt offers a cash prize of approximately \$100,000 for the discovery of means of control of the cotton leaf worm Prodenia litura.

A statement of conditions for competition sets forth: "The Royal Agricultural Society has decided to grant a prize of twenty thousand Egyptian pounds to the inventor of a preventive remedy for the affliction of the cotton leaves by the worm known as Prodenia litura, in such a way that no white blotches caused by the eggs or larvae of this pest would appear."

Among the requirement is a written detailed statement containing a full description of the remedy, its composition and method of application. If the remedy comprises the application of a certain definite substance, two samples must be submitted.

"Applicants in the competition must belong to a recognized scientific body, or be presented by a public or scientific institute of recognized Egyptian origin, if Egyptians, or recognized abroad if the applicants are foreigners."

Complete details may be obtained by addressing Mr. M. Amine Youssef, Egyptian Minister, Royal Egyptian Legation, Washington, D.C.

The Research Situation in the United States

The Royal Egyptian Agricultural Society is to be commended for its offer of an award for so important an achievement as control of a serious pest of Egypt's valuable cotton crop.

Substantial reward is certainly the due of those who through unremitting endeavors achieve worth-while things for the economic welfare of the country and the financial profit of individuals engaged in agricultural pursuits.

Success in private or commercial research usually brings its own financial reward. Likewise, a portion of the profit enables the private research worker or an industrial research organization to

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pursue further researches along like or other lines. In this connection, it is to be noted that the "profit motive" has contributed very importantly to national progress and prosperity in many directions. Agriculture is one of the chief beneficiaries of the results of research made possible by profits from sales of products necessary to efficiency and economy in farming.

The Egyptian agricultural authorities by offering so large a sum as \$100,000 for an insecticide for a single use establishes a precedent which will cause considerable thought because of the recognition given profit as an impelling motive. This, despite the fact that the Nobel awards and others give encouragement to achievements in various fields.

THE USE OF EXPLOSIVES IN SOIL EROSION CONTROL
DESCRIBED IN NEW PUBLICATION ON THIS SUBJECT

EDITOR'S NOTE:- In view of the fact that soil erosion is one of the most vital problems facing the country today, the publication of a booklet which describes control methods is of timely interest.

Agricultural engineers have found the solution for checking gully erosion in cut-off ditches, soil saving dams, gully bank grading and the growth of vegetation. However, many thousands of these gullies have almost vertical sides. Therefore, the banks must be sloped for plantation, but teams and tractors cannot be used to work the drop-off edges. In such cases, blasting the top sides of the banks to throw the fertile topsoil in a gully has proved to be the most effective method of procedure. For this reason, explosives are playing an important part in the country's erosion control program.

An informative booklet, titled "Blasting Gully Banks with Explosives", has just been prepared by the Agricultural Extension Section of the du Pont Company. Not only is the subject of gully bank blasting methods described, but also the terracing of farm lands and tree cultivation. The text of this 36-page publication is illustrated with plates made from photographs and line drawings. A number of diagrams are also included.

Copies of this booklet may be obtained by addressing requests to the Agricultural Extension Section, E. I. du Pont de Nemours & Company, Wilmington, Delaware. The booklet is for domestic distribution only. Copies are not available for mailing to foreign countries.

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